

## Nanowire Building Blocks for Photonics & Electronics

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Nanowires are of both fundamental and technological interest. They represent the critical components in the potential nanoscale electronic and photonic device applications. In our lab, the vapor-liquid-solid crystal growth mechanism has been utilized for the general synthesis of nanowires of different compositions, sizes, and orientation. Precise size/positional control of the nanowires can be readily achieved using metal nanocrystals as the catalysts. Epitaxial growth plays a significant role in making such nanowire heterostructures and their arrays. We have successfully synthesized superlattice nanowires and core-sheath nanostructures. Achieving high level of synthetic control over nanowire growth allows us to explore some of their very unique physical properties. For example, semiconductor nanowires can function as self-contained nanoscale lasers, sub-wavelength optical waveguides, frequency converters and photodetectors. It was also discovered that the thermoconductivity of the silicon nanowires can be significantly reduced when the nanowire size in the 20 nm region, pointing to a very promising approach to design better thermoelectrical materials for energy conversion.